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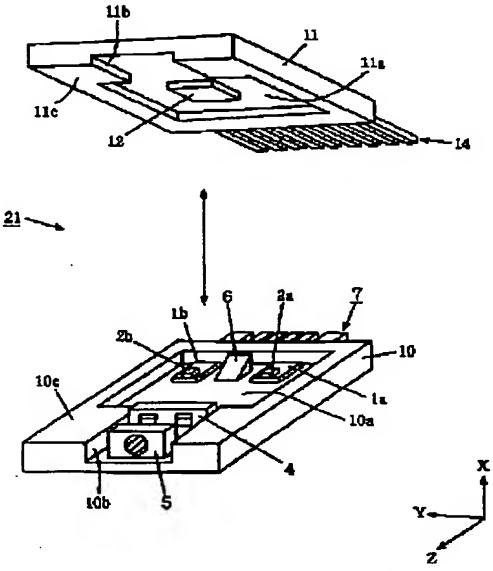
(54) OPTICAL PICKUP DEVICE AND OPTICAL RECORDING MEDIUM DRIVING DEVICE EQUIPPED WITH THE SAME

(57) Abstract:

PROBLEM TO BE SOLVED: To provide an optical pickup device which is applicable to a plurality of information recording media whose information recording densities are different and whose size is reduced.

SOLUTION: A DVD reproducing 1st semiconductor laser device 2a and a CD reproducing 2nd semiconductor laser device 2b are provided on the supporting plane 10a of a lower frame 10. In the laser beam emitting direction of the 1st and 2nd semiconductor laser devices 2a and 2b, a trisectionizing diffraction lattice 4 by which the laser beam is divided into three diffracted beams, i.e., a 0 degree diffracted beam and ±1st degree diffracted beams, and a transmitting hologram device 5 by which three diffracted beams are diffracted in a 1st degree diffraction direction and a -1st degree diffraction direction and transmitted are provided. Further, a reflective mirror 6 provided on the supporting plane 10a reflects a feedback beam vertically upward and guides the beam to a photodetector 12 attached to an upper frame 11.



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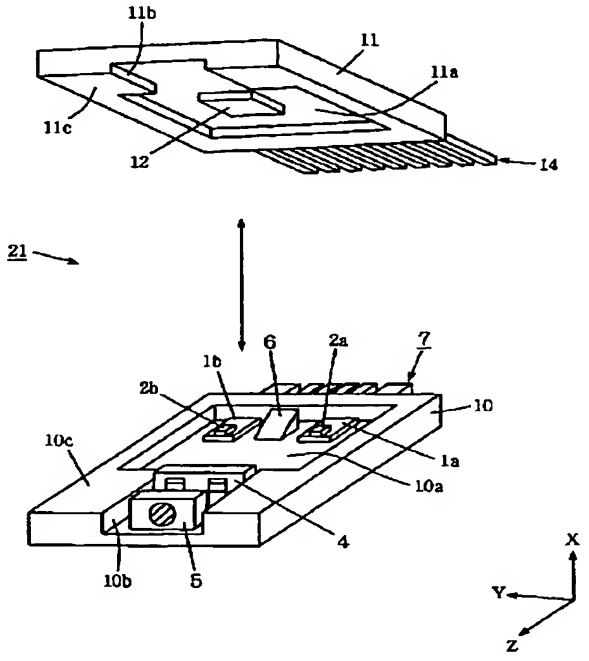
(54)【発明の名称】　光ピックアップ装置およびそれを備えた光学記録媒体駆動装置

(57)【要約】

【課題】　情報記録密度の異なる複数の情報記録媒体に対して適用可能でかつ小型化された光ピックアップ装置を提供する。

【解決手段】　下フレーム１０の支持面１０ａにＤＶＤ再生用の第１半導体レーザ素子２ａおよびＣＤ再生用の第２半導体レーザ素子２ｂを配置する。第１および第２半導体レーザ素子２ａ，２ｂの出射方向にはレーザ光を０次および±１次の３本の回折光に分解する３分割用回折格子４および３本の回折光を１次および－１次の回折方向に回折透過する透過型ホログラム素子５が配置されている。さらに、支持面１０ａに配置された反射ミラー６は帰還光束を鉛直上方に反射し、上フレーム１１に取り付けられた受光素子１２に導く。



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【特許請求の範囲】

【請求項１】　所定の支持面に配置され、前記支持面とほぼ平行な方向に互いに波長の異なる光束を出射する複数の発光素子と、

前記複数の発光素子から出射された光束をそれぞれ回折させて所定の光軸方向に透過させる回折素子と、

前記複数の発光素子からそれぞれ出射された光束に基づく帰還光束を受光する受光素子とを備え、

前記受光素子は、前記複数の発光素子が配置された前記支持面と異なる支持面に配置されたことを特徴とする光ピックアップ装置。

【請求項２】　第１の支持面が形成された第１の支持部材と、

前記第１の支持面に配置され、記録密度の異なる複数種類の光学記録媒体に対応した波長の光束を前記第１の支持面にほぼ平行に出射する複数の発光素子と、

前記複数の発光素子から出射された光束を回折させるとともに前記発光素子からの光束に基づく帰還光束を透過させる回折素子と、

前記複数の発光素子が配置される前記第１の支持面とほぼ平行な第２の支持面を有する第２の支持部材と、

前記第２の支持面に配置され、前記回折素子を透過した前記帰還光束を受光する受光素子とを備えたことを特徴とする光ピックアップ装置。

【請求項３】　前記複数の発光素子は、前記回折素子の回折面に直交する軸に対して斜め方向から光束を出射し、

前記回折素子の回折面は、前記回折面に対して斜め方向から入射する光束を前記第１の支持面にほぼ平行な面内でかつ前記回折面に直交する軸に沿って回折して透過することを特徴とする請求項２記載の光ピックアップ装置。

【請求項４】　前記複数の発光素子は、第１の波長の光束を出射する第１の発光素子と、第１の波長と異なる第２の波長の光束を出射する第２の発光素子とを含み、

前記第１の発光素子からの光束の光路と前記第２の発光素子からの光束の光路とは前記回折素子で回折後一致することを特徴とする請求項３記載の光ピックアップ装置。

【請求項５】　前記複数の発光素子は、第１の波長の光束を出射する第１の発光素子と、前記第１の波長と異なる第２の波長の光束を出射する第２の発光素子とを含み、

前記第１の発光素子と前記第２の発光素子は、それぞれ前記回折素子の回折面に直交する軸に対して互いに反対側に配置され、

前記受光素子は、前記回折素子の回折面に直交する軸に沿って配置されたことを特徴とする請求項３記載の光ピックアップ装置。

【請求項６】　前記第１の支持面に配置され、前記回折

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素子を透過した前記帰還光束を反射して前記受光素子に導く反射部材をさらに備えたことを特徴とする請求項２～５のいずれかに記載の光ピックアップ装置。

【請求項７】　前記第１の支持部材と前記第２の支持部材は、前記第１の支持面および前記第２の支持面にほぼ平行な接合面を有することを特徴とする請求項２～６のいずれかに記載の光ピックアップ装置。

【請求項８】　前記第１の支持部材の前記第１の支持面には前記第１の発光素子に電気的に接続される第１配線部材および前記第２の発光素子に電気的に接続される第２配線部材が配置され、

前記第２の支持部材の前記第２の支持面には、前記受光素子に接続される第３配線部材が配置されており、

前記第１および第２配線部材の一部は前記第１の支持部材から突出し、前記第３配線部材の一部は前記第２の支持部材から突出していることを特徴とする請求項４～７のいずれかに記載の光ピックアップ装置。

【請求項９】　請求項１～７のいずれかに記載の光ピックアップ装置と、

光学記録媒体を回転させる回転駆動部と、

前記光ピックアップ装置を前記光学記録媒体の半径方向に移動させる光ピックアップ駆動部と、

前記光ピックアップ装置の受光素子から出力される信号を処理する処理部とを備えたことを特徴とする光学記録媒体駆動装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、光ピックアップ装置およびそれを備えた光学記録媒体駆動装置に関する。

【０００２】

【従来の技術】近年、種々の情報記録媒体に対応する光ピックアップ装置が研究開発されている。

【０００３】図８は、従来の光ピックアップ装置の構成図である。この光ピックアップ装置は、非点収差法によるフォーカスサーボおよび３ビーム法によるトラッキングサーボを行う装置であり、例えば特開平３－７６０３５号公報に開示されている。

【０００４】図８に示すように、光ピックアップ装置は、レーザ光を鉛直上方に出射する半導体レーザ１０２、レーザ光を３本の光束に分割する３分割用回折格子１０３、分割された３本の光束を透過し、かつ光ディスク１００からの帰還光束を回折するホログラム素子１０４、ホログラム素子１０４を透過した３本の光束を光ディスク１００の記録面に３個のスポットとして集光するための集光レンズ１０５およびホログラム素子１０４で回折された帰還光束を検出する光検出器１０６を備えている。

【０００５】上記の光ピックアップ装置において、半導体レーザ１０２からは所定の波長のレーザ光が出射され、３分割用回折格子１０３、ホログラム素子１０４お

よび集光レンズ１０５からなる光学系を通過して光ディスク１００の記録面に照射される。照射された光束は光ディスク１００の記録面に記録された情報を含む帰還光束として反射され、集光レンズ１０５、ホログラム素子１０４を透過して受光素子１０６に入射する。受光素子１０６では受光した光束に基づいて、情報の検出信号、フォーカスサーボ信号およびトラッキングサーボ信号をそれぞれ出力する。

【０００６】最近では、ＣＤ（コンパクトディスク）のみならずトラック密度等の記録密度が異なる種々の規格の情報記録媒体、例えばＤＶＤ（デジタルビデオディスク）等が開発されている。このため、異なる記録密度を有する種々の情報記録媒体の再生を行うことが可能な光ピックアップ装置が望まれている。

【０００７】

【発明が解決しようとする課題】しかしながら、図８に示す従来の光ピックアップ装置では、特定の情報記録媒体、例えばＣＤの再生に適した波長のレーザ光を出射する半導体レーザ１０２および各光学素子が設定されている。このため、記録密度が異なる他の規格の情報記録媒体を再生することができない。

【０００８】そこで、発明者らは、情報記録媒体の記録密度に適した波長の光を出射する複数の光源を有する光ピックアップ装置に着目し、例えばＣＤとＤＶＤの再生に適した波長のレーザ光を出射する２つの半導体レーザ素子を用いた光ピックアップ装置を提案した。本提案に係る光ピックアップ装置は、特願平７－２８３４６１号として出願されており、本願の出願日においては未公開である。

【０００９】上記提案に係る光ピックアップ装置は、再生対象の情報記録媒体の種類に応じて２つの半導体レーザ素子のいずれかが選択され、選択された半導体レーザ素子から所定の波長のレーザ光を鉛直上方に出射し、情報記録媒体の記録面に入射させるとともにその帰還光束を受光素子に入射させて情報検出信号等を出力するものである。

【００１０】また、最近では光ピックアップ装置の小型化、軽量化および低価格化が強く要求されている。そこで、発明者らは、かかる要求に従って上記提案の光ピックアップ装置に対して鋭意研究を行い、本発明の光ピックアップ装置を開発するに至ったものである。

【００１１】本発明の目的は、情報記録密度の異なる複数の情報記録媒体に対して適用可能でかつ小型化された光ピックアップ装置およびそれを備えた光学記録媒体駆動装置を提供することである。

【００１２】

【課題を解決するための手段および発明の効果】本発明に係る光ピックアップ装置は、所定の支持面に配置され、支持面とほぼ平行な方向に互いに波長の異なる光束を出射する複数の発光素子と、複数の発光素子から出射された光束をそれぞれ回折させて所定の光軸方向に透過させる回折素子と、複数の発光素子からそれぞれ出射された光束に基づく帰還光束を受光する受光素子とを備え、受光素子が、複数の発光素子が配置された支持面と異なる支持面に配置されたものである。

【００１３】本発明に係る光ピックアップ装置においては、記録密度の異なる複数の光学記録媒体に適した波長の光束を出射する複数の発光素子を備え、処理対象の光学記録媒体の種類に応じて最適な発光素子を選択して使用することにより、１つの光ピックアップ装置によって複数種類の光学記録媒体の再生処理等が可能となる。しかも、光ピックアップ装置が再生装置等に組み込まれた状態で、発光素子から出射した光束およびそれに基づく帰還光束の光路の大部分が水平方向となるように構成したことにより、光学記録媒体に直交する光路領域が短縮され、かつ投受光ユニットの鉛直方向の厚みが低減されて光ピックアップ装置全体を薄型化することができる。

【００１４】なお、投受光ユニットとは、光ピックアップ装置における発光素子、透過型回折素子、受光素子あるいは分割用回折素子をユニット化した部分であり、光学記録媒体と回折素子との間の光路中に配置される反射ミラーや集光レンズを除く部分である。

【００１５】さらに、発光素子と受光素子とを異なる支持面に配置したことにより、発光素子に接続される配線部材と受光素子に接続される配線部材とが同一平面に配置されることが防止され、投受光ユニットの幅寸法を縮小することができる。これによって、光ピックアップ装置の平面領域を縮小することができる。

【００１６】特に、本発明に係る光ピックアップ装置は、第１の支持面が形成された第１の支持部材と、第１の支持面に配置され、記録密度の異なる複数種類の光学記録媒体に対応した波長の光束を前記第１の支持面にほぼ平行に出射する複数の発光素子と、複数の発光素子から出射された光束を回折させるとともに発光素子からの光束に基づく帰還光束を透過させる回折素子と、複数の発光素子が配置される第１の支持面とほぼ平行な第２の支持面を有する第２の支持部材と、第２の支持面に配置され、回折素子を透過した帰還光束を受光する受光素子とを備えたものである。

【００１７】本発明に係る光ピックアップ装置においては、記録密度の異なる複数の光学記録媒体に適した波長の光束を出射する複数の発光素子を備え、処理対象の光学記録媒体の種類に応じて最適な発光素子を選択して使用することにより、１つの光ピックアップ装置によって複数種類の光学記録媒体の再生処理等が可能となる。しかも、光ピックアップ装置が再生装置等に組み込まれた状態で、発光素子から出射した光束およびそれに基づく帰還光束の光路の大部分が水平方向となるように構成したことにより、光学記録媒体に直交する光路領域が短縮され、かつ投受光ユニットの鉛直方向の厚みが低減され

て光ピックアップ装置全体を薄型化することができる。

【００１８】さらに、発光素子と受光素子とを異なる支持面に配置したことにより、発光素子に接続される配線部材と受光素子に接続される配線部材とが同一平面に配置されることが防止され、投受光ユニットの幅寸法を縮小することができる。これによって、光ピックアップ装置の平面領域を縮小することができる。

【００１９】また、複数の発光素子は、回折素子の回折面に直交する軸に対して斜め方向から光束を出射し、回折素子の回折面は、回折面に対して斜め方向から入射する光束を第１の支持面にほぼ平行な面内でかつ回折面に直交する軸に沿って回折して透過するものである。

【００２０】特に、複数の発光素子が第１の波長の光束を出射する第１の発光素子と、第１の波長と異なる第２の波長の光束を出射する第２の発光素子とを含み、第１の発光素子からの光束の光路と第２の発光素子からの光束の光路とは、回折素子で回折後一致することが好ましい。

【００２１】この場合、回折素子以降の第１の発光素子および第２の発光素子からの光束に対して共通に光学系を設けることができ、光学系の構成が簡素化され、かつ調整も容易となる。

【００２２】特に、複数の発光素子が、第１の波長の光束を出射する第１の発光素子と、第１の波長と異なる第２の波長の光束を出射する第２の発光素子とを含み、第１の発光素子と第２の発光素子とが、それぞれ回折素子の回折面に直交する軸に対して互いに反対側に配置されおり、受光素子が、回折素子の回折面に直交する軸に沿って配置されることが好ましい。この場合、第１および第２の発光素子の両方を回折素子の回折面に直交する軸の一方側に配置すると、両者の配置すべき位置が近接して配置が困難になるという問題が生じることを防止することができる。また、第１の支持面に配置され、回折素子を透過した帰還光束を反射して受光素子に導く反射部材をさらに備えることが好ましい。これにより、発光素子と異なる支持面に配置された受光素子に対して帰還光束を容易に導くことができる。

【００２３】特に、第１の支持部材と第２の支持部材が、第１の支持面および第２の支持面にほぼ平行な接合面を有することを好ましい。この場合には、接合面に沿って第１の支持部材と第２の支持部材とを相対移動させることによって、反射部材と受光素子の位置を調整することが容易となる。

【００２４】さらに、第１の支持部材の第１の支持面には第１の発光素子に電気的に接続される第１配線部材および第２の発光素子に電気的に接続される第２配線部材が配置され、第２の支持部材の第２の支持面には、受光素子に接続される第３配線部材が配置されており、第１および第２配線部材の一部は第１の支持部材から突出し、第３配線部材の一部は第２の支持部材から突出している。この場合には、第１および第２の発光素子に接続される第１および第２配線線部材と、受光素子に接続される第３配線部材とが異なる平面位置に形成される。それゆえ、複数の配線部材が同一平面に配置されて投受光ユニットの幅寸法が増大することが抑制され、それによって平面積が縮小された小型の光ピックアップ装置を得ることができる。

【００２５】本発明に係る光学記録媒体駆動装置は、上記発明のいずれかに記載の光ピックアップ装置と、光学記録媒体を回転させる回転駆動部と、光ピックアップ装置を光学記録媒体の半径方向に移動させる光ピックアップ駆動部と、光ピックアップ装置の受光素子から出力される信号を処理する処理部とを備えたものである。

【００２６】本発明に係る光学記録媒体駆動装置においては、複数の発光素子を有する光ピックアップ装置を備えたことにより、記録密度の異なる複数種類の光学記録媒体の再生信号検出等が可能となる。しかも、光ピックアップ装置の厚み及び幅が低減されたことにより、小型で、特に薄型化された光学記録媒体駆動装置を得ることができる。

【００２７】

【発明の実施の形態】図１は、本発明の一実施例による光ピックアップ装置の側面断面図である。本実施例の光ピックアップ装置は、ＣＤとＤＶＤの再生信号検出が可能に構成されている。図１において、光ピックアップ装置２０は、第１および第２半導体レーザ素子２ａ，２ｂ、３分割用回折格子４、透過型ホログラム素子５等がユニット化された投受光ユニット２１と、反射ミラー１４と、対物レンズ１５とを備える。

【００２８】図２は、投受光ユニットの分解斜視図であり、図３は投受光ユニットの上フレームの平面図であり、図４は下フレームの平面図である。なお、図１～図４における各図面の位置関係を明確にするために各図中にＸ軸，Ｙ軸，Ｚ軸を記載する。

【００２９】図２～図４において、投受光ユニット２１は、樹脂モールドよりなる上フレーム（第２の支持部材）１１および下フレーム（第１の支持部材）１０が積層され、相互に接着固定された筐体を有している。

【００３０】図２および図４において、下フレーム１０は平板状の樹脂モールドからなり、第１および第２半導体レーザ素子２ａ，２ｂ、反射ミラー６等が配置される支持面（第１の支持面）１０ａおよび３分割用回折格子４と透過型ホログラム素子５とが配置される凹部１０ｂを有している。また、支持面１０ａおよび凹部１０ｂの周辺部には上フレーム１１と接合される平坦な接合面１０ｃが形成されている。

【００３１】図４において、光ディスク（光学記録媒体）からの帰還光束の光軸をＺ０で示し、第１半導体レーザ素子２ａ（第１の発光素子）から出射される光束の光軸をＺ１で示し、第２半導体レーザ素子２ｂ（第２の

発光素子）から出射されるレーザ光の光軸をＺ２で示す。下フレーム１０の支持面１０ａ上には２つの導電性ヒートシンク１ａ，１ｂが配置されており、導電性ヒートシンク１ａ，１ｂの上面に第１および第２半導体レーザ素子２ａ，２ｂおよびモニタ用のフォトダイオード３ａ，３ｂが配置されている。Ｚ１軸は、後述する透過型ホログラム素子５の＋１次の回折方向に一致しており、第１半導体レーザ素子２ａがこのＺ１軸に沿って配置されている。また、Ｚ２軸は透過型ホログラム素子の－１次の回折方向に一致しており、第２半導体レーザ２ｂがこのＺ２軸に沿って配置されている。

【００３２】第１半導体レーザ２ａは、波長６３５ｎｍのレーザ光を出力し、ＤＶＤ再生時に使用される。また、第２半導体レーザ素子２ｂは、波長７８０ｎｍのレーザ光を出力し、ＣＤ再生時に使用される。

【００３３】モニタ用のフォトダイオード３ａ，３ｂはそれぞれ第１半導体レーザ素子２ａおよび第２半導体レーザ素子２ｂの後端面側に配置されており、第１および第２半導体レーザ素子２ａ，２ｂの後端面から出射されたレーザ光をモニタ光としてそれぞれ受光する。モニタ用のフォトダイオード３ａ，３ｂからの出力信号は自動出力制御回路（図示せず）に出力され、この出力信号に基づいて第１および第２半導体レーザ素子２ａ，２ｂのレーザ光の出力が一定となるように制御される。

【００３４】さらに、支持面１０ａには、第１半導体レーザ素子２ａおよび第２半導体レーザ素子２ｂにそれぞれ電力を供給するリードフレーム７ｃ，７ｆ、リードフレーム７ｃ，７ｆとは逆極性側のリードフレーム７ｄ，７ｅ、モニタ用のフォトダイオード３ａ，３ｂからの信号を出力するリードフレーム７ｂ，７ｇおよび第１および第２半導体レーザ素子２ａ，２ｂとモニタ用のフォトダイオード３ａ，３ｂに共通（例えばアース用）のリードフレーム７ａ，７ｈが配置されている。各リードフレーム７ａ～７ｈの端部は下フレーム１０の端面から外方に突出している。

【００３５】支持面１０ａの中央付近には、帰還光束の光軸Ｚ０に沿って反射ミラー６が配置されている。反射ミラー６はＺ０軸に沿って帰還する帰還光束を鉛直上方に反射するようにその反射面が水平面（Ｙ－Ｚ面）に対して４５度傾けて設定されている。

【００３６】下フレーム１０の凹部１０ｂには、３分割用回折格子４および透過型ホログラム素子５が配置されている。３分割用回折格子４は第１半導体レーザ素子２ａおよび第２半導体レーザ素子２ｂ側の表面にそれぞれ等ピッチの凹凸からなる回折格子面４ａ，４ｂが形成されている。３分割用回折格子４の回折格子面４ａは、第１半導体レーザ素子２ａから出射されたレーザ光を０次と＋１次と－１次の３本の回折光に分割して出射する。また、回折格子面４ｂは第２半導体レーザ素子２ｂから出射されたレーザ光を０次と＋１次と－１次の３本の回折光に分割して出射する。

【００３７】透過型ホログラム素子（回折素子）５は、３分割用回折格子４側の表面に凹凸のピッチが漸次的に変化する曲線群からなるホログラム面５ａを有する透光性材料から構成されている。そして、Ｚ１軸に沿って３分割用回折格子４を透過した３本の回折光をＺ０軸方向に回折し、Ｚ２軸に沿って３分割用回折格子４から出射された３本の回折光をＺ０軸方向に回折する。好ましくは、波長６３５ｎｍのレーザ光の光路と波長７８０ｎｍのレーザ光の光路はホログラム面５ａを透過回折後、一致する。また、光ディスクからの帰還光束をＺ０軸に沿って透過し、３分割用回折格子４および反射ミラー６に導く。

【００３８】図２および図３において、上フレーム１１は、平板状の樹脂モールドからなり信号検出用のフォトダイオード１２が取り付けられる支持面１１ａおよび下フレーム１０の凹部１０ｂに対応する凹部１１ｂが形成されている。支持面１１ａおよび凹部１１ｂの周囲には平坦な接合面１１ｃが形成されている。

【００３９】信号検出用のフォトダイオード１２は、受光面１３が下フレーム１０に取り付けられた反射ミラー６からの帰還光束を受光し得る位置に取り付けられている。なお、図３において受光面１３は単一の長方形状に表示されているが、実際には、非点収差法によるフォーカス信号および再生信号を出力するための複数の分割受光面と、３ビーム法によるトラッキングエラー信号を出力するための複数の分割受光面とから構成されている。また、フォトダイオード１２は、ＰＩＮ型フォトダイオードから構成されている。フォトダイオード１２が支持面１１ａに取り付けられた状態で、フォトダイオード１２の受光面１３は下フレーム１０の支持面１０ａとほぼ平行に配置されている。

【００４０】信号検出用のフォトダイオード１２の近傍には、フォトダイオード１２からの信号出力用の複数本のリードフレーム１４が配置されている。リードフレーム１４の一端はフォトダイオード１２の近傍に延び、ボンディングワイヤによりフォトダイオード１２の端子と電気的に接続されている。また、他端は上フレーム１１を貫通し、上フレーム１１の端面から外方に突出している。

【００４１】上記の投受光ユニット２１装置の製造時において、透過型ホログラム素子５は、第１および第２半導体レーザ素子２ａ，２ｂからのレーザ光がそれぞれＣＤおよびＤＶＤの記録面に焦点を結ぶようにＺ軸方向の位置が調整される。また、反射ミラー６により反射された帰還光束がフォトダイオード１２の受光面１３に正確に入射するように上フレーム１１が下フレーム１０に対して接合面１０ｃ，１１ｃに沿って相対移動されて調整される。調整が終了すると、上フレーム１１および下フレーム１０が接着剤により固定される。これにより、投

受光ユニット２１が完成する。さらに、投受光ユニット２１は、光ピックアップ装置２０の反射ミラー１４および集光レンズ１５と所定の位置関係となるように光ピックアップ装置２０の内部に配置される。

【００４２】次に、本実施例による光ピックアップ装置の動作について説明する。図５は図１の光ピックアップ装置の投受光ユニットの光学系の動作を示す側面模式図であり、図６は投受光ユニットの光学系の平面模式図である。

【００４３】図１、図５および図６を参照して、まずＤＶＤの再生動作について説明する。光ピックアップ装置２０は第１半導体レーザ素子２ａを駆動し、波長６３５ｎｍのレーザ光を出射させる。第１半導体レーザ素子２ａから出射されたレーザ光Ｂ１は、透過型の３分割用回折格子４の回折格子面４ａに入射し、０次、＋１次および－１次の３本の回折光に分割されて透過した後、透過型ホログラム素子５に入射する。透過型ホログラム素子５は入射した３本の回折光を＋１次の回折方向に回折透過し、Ｚ０軸に沿って反射ミラー１４に出射する。反射ミラー１４は３本の回折光をほぼ鉛直上方に反射する。集光レンズ１５は、反射ミラー１４により反射された３本の回折光をＤＶＤの記録面に主スポットおよび２つの副スポットとして集光させる。主スポットは情報の記録面（トラック面）に集光され、２つの副スポットはトラック面と非トラック面とにまたがる位置に集光される。

【００４４】そして、主スポットおよび２つの副スポットからの帰還光束は再び集光レンズ１５を通り、鉛直下方に進行し、反射ミラー１４により水平方向に反射されて透過型ホログラム素子５に入射する。入射した帰還光束は透過型ホログラム素子５を透過し、さらに３分割用回折格子の回折格子面４ａ，４ｂが形成されていない部分を透過して反射ミラー６に入射する。

【００４５】反射ミラー６は帰還光束を鉛直上方に反射し、上フレーム１１に取り付けられた信号検出用のフォトダイオード１２の受光面１３に導く。

【００４６】フォトダイオード１２は、帰還光束に基づき、再生信号、非点収差法によるフォーカス信号および３ビーム法によるトラッキングエラー信号を生成してリードフレーム１４を通して出力する。

【００４７】次に、ＣＤの再生動作について説明する。ＣＤの再生にはＤＶＤの再生に比べて長波長のレーザ光が用いられる。すなわち、波長７８０ｎｍのレーザ光を出射する第２半導体レーザ素子２ｂが駆動される。第２半導体レーザ素子２ｂから出射されたレーザ光Ｂ２は、３分割用回折格子４の回折格子面４ｂに入射する。回折格子面４ｂはレーザ光Ｂ２を０次、＋１次および－１次の３本の回折光に分割して透過する。３本の回折光は、透過型ホログラム素子５のホログラム面５ａにより－１次方向に回折され、Ｚ０軸に沿って出射される。

【００４８】その後、３本の回折光は、ＤＶＤの再生動作と同様に、反射ミラー１４、集光レンズ１５を透過してＣＤの記録面に主スポットおよび２つの副スポットとして集光される。さらに、ＣＤの記録面で反射された帰還光束は集光レンズ１５および反射ミラー１４を通り透過型ホログラム素子５に入射する。さらに、透過型ホログラム素子５および３分割用回折格子４を透過して反射ミラー６に到達する。反射ミラー６は帰還光束をほぼ鉛直上方に反射し、信号検出用のフォトダイオード１２の受光面１３に入射させる。フォトダイオード１２は受光した帰還光束に基づいて、ＣＤの再生信号、非点収差法によるフォーカス信号および３ビーム法によるトラッキングエラー信号をそれぞれ出力する。

【００４９】上記の光ピックアップ装置では、ＤＶＤの再生に適した短波長のレーザ光を出射する第１半導体レーザ素子２ａと、ＣＤの再生に適した長波長のレーザ光を出射する第２半導体レーザ素子２ｂとを備え、再生対象の記録媒体に応じて第１および第２半導体レーザ素子２ａ，２ｂを使い分けることにより、単一の光ピックアップ装置で記録密度の異なるＣＤとＤＶＤの双方の再生処理を行うことができる。しかも、光源である第１および第２半導体レーザ素子２ａ，２ｂを除き、他の光学系は光学記録媒体の種類によらず共通に使用される。それゆえ、光ピックアップ装置の構成部品の点数を増加させることなく小型化および低価格化を図ることができる。

【００５０】さらに、第１および第２半導体レーザ素子２ａ，２ｂからのレーザ光の出射方向を水平方向としたことにより、光ピックアップ装置の鉛直方向の厚さを薄くすることができる。

【００５１】さらに、信号検出用のフォトダイオード１２を３分割用回折素子４、透過型ホログラム素子５および反射ミラー６等の光学系と異なる上フレーム１１の支持面１１ａに形成したことにより、光学系との位置調整を独立して正確に行うことが可能となる。

【００５２】なお、上記の実施例では、ＣＤとＤＶＤの２種類の光学記録媒体を再生し得る光ピックアップ装置について説明したが、他の記録密度を有する光学記録媒体に対してもその再生あるいは記録に最適な波長の光源をさらに備えることにより再生あるいは記録処理を行うことが可能である。

【００５３】また、上記の実施例では、回折素子として透過型ホログラム素子を用いたが、これに限定されることなく、例えば反射型回折格子を用いてもよい。

【００５４】図７は、本実施例の光ピックアップ装置を用いた光学記録媒体駆動装置の構成を示すブロック図である。光学記録媒体駆動装置は、光ディスク１００を回転駆動させるモータ２７およびモータ２７の回転動作を制御する回転制御系２６を有する。また、光ピックアップ装置２０は、光ピックアップ装置２０の検出位置を光ディスク１００の半径方向に移動させる送りモータ２２が接続されている。送りモータ２２は送りモータ制御系

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２３によりその動作が制御される。光ピックアップ装置２０の動作はピックアップ制御系２４により制御され、光ピックアップ装置２０からの出力は信号処理系２５により制御されている。

【００５５】さらに、光学記録媒体駆動装置の各処理系の動作はドライブコントローラ２８により制御されている。この光学記録媒体駆動装置は、ドライブインターフェース２９を介して再生装置に接続され、光ピックアップ装置２０からの検出信号に基づいた情報再生処理が行われる。

【００５６】上記のような光学記録媒体駆動装置に本発明の光ピックアップ装置２０を用いることにより、複数種類の光学記録媒体の再生処理を行うことが可能となる。さらに、光ピックアップ装置２０が小型化されたことにより、光学記録媒体駆動装置全体を小型化することができる。

【図面の簡単な説明】

【図１】本発明の実施例による光ピックアップ装置の側面断面図である。

【図２】図１の光ピックアップ装置の投受光ユニットの分解斜視図である。

【図３】図２の投受光ユニットの上フレームの平面図で＊ある。

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＊ある。

【図４】図２の投受光ユニットの下フレームの平面図である。

【図５】投受光ユニットの光学系の動作を示す側面模式図である。

【図６】投受光ユニットの光学系の動作を示す平面模式図である。

【図７】光ピックアップ装置を用いた光学記録媒体駆動装置の構成を示すブロック図である。

【図８】従来の光ピックアップ装置の構成図である。

【符号の説明】

２ａ，２ｂ　第１半導体レーザ素子，第２半導体レーザ素子

４　３分割用回折格子

４ａ，４ｂ　回折格子面

５　透過型ホログラム素子

５ａ　ホログラム面

６　反射ミラー

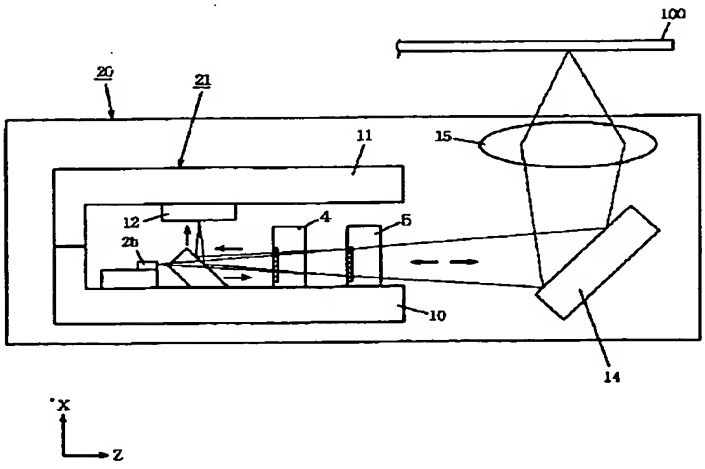
１０　下フレーム

１１　上フレーム

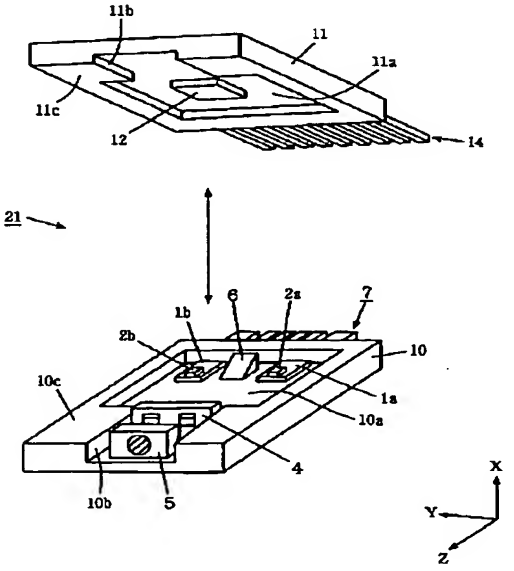
１０ａ，１１ａ　支持面

１０ｃ，１１ｃ　接合面

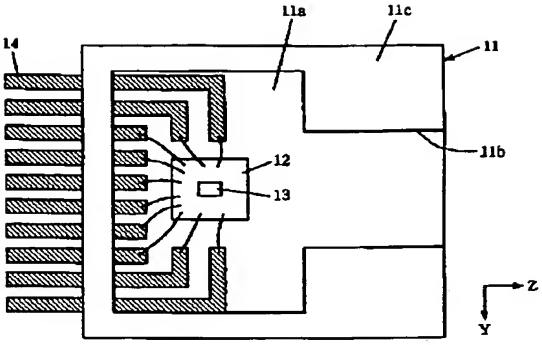
【図１】



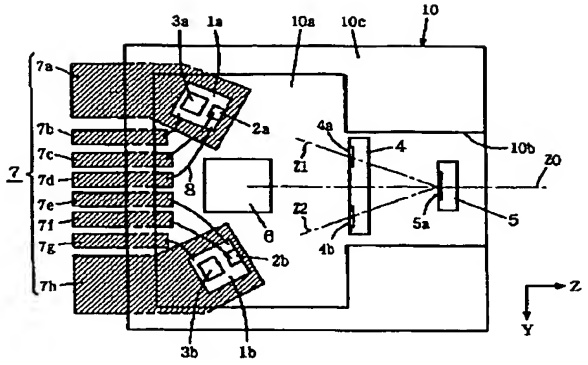
【図２】



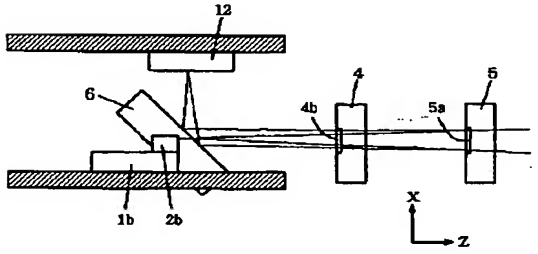
【図３】



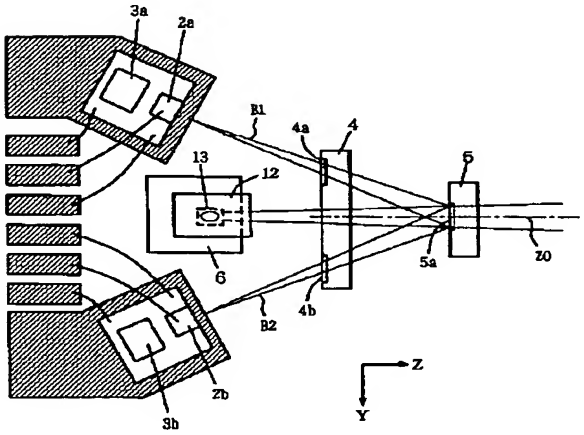
【図４】



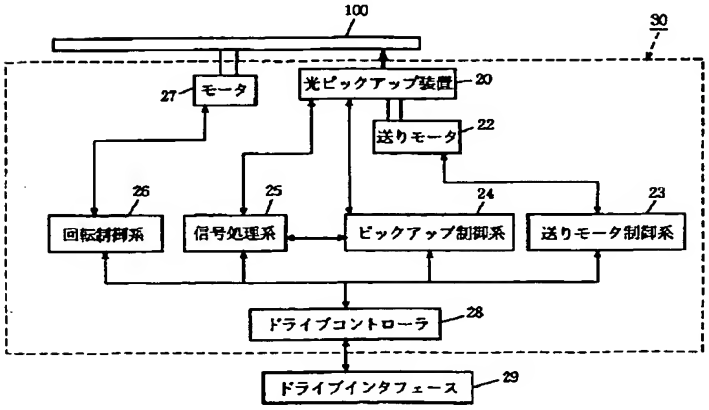
【図５】



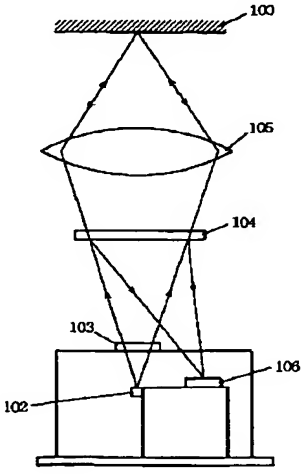
【図６】



【図７】



【図８】



フロントページの続き

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* NOTICES *

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, with the conventional optical pickup equipment shown in drawing 8 , the semiconductor laser 102 and each optical element which carry out outgoing radiation of a specific information record medium, for example, the laser beam of wavelength suitable for playback of CD, are set up. For this reason, the information record medium of other specification that recording density differs is unreproducible.

[0008] Then, artificers proposed the optical pickup equipment using two semiconductor laser components which carry out outgoing radiation of the laser beam of wavelength suitable for playback of CD and DVD paying attention to the optical pickup equipment which has two or more light sources which carry out outgoing radiation of the light of wavelength suitable for the recording density of an information record medium. It applies as Japanese Patent Application No. No. 283461 [seven to], and the optical pickup equipment concerning this proposal has not been exhibited in the filing date of application of this application.

[0009] It carries out incidence of the feedback flux of light to a photo detector, and outputs an information detecting signal etc. while the optical pickup equipment concerning the above-mentioned proposal is chosen, and either of two semiconductor laser components carries out outgoing radiation of the laser beam of predetermined wavelength to the vertical upper part from the selected semiconductor laser component and makes it it carry out incidence to the recording surface of an information record medium according to the class of information record medium for playback.

[0010] Moreover, recently requires strongly the miniaturization of optical pickup equipment, lightweight-izing, and low-pricing. Then, artificers inquire wholeheartedly to the optical pickup equipment of the above-mentioned proposal according to this demand, and come to develop the optical pickup equipment of this invention.

[0011] The purpose of this invention is offering the optical record-medium driving gear equipped with the optical pickup equipment and it which could apply to two or more information record media with which information recording density's differs, and were miniaturized.

[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] It is optical pickup equipment which is equipped with the following and characterized by having arranged said photo detector at said back face by which said two or more light emitting devices have been arranged, and a different back face. Two or more light emitting devices which carry out outgoing radiation of the flux of light from which it is arranged at a predetermined back face, and wavelength differs mutually in the direction almost parallel to said back face The diffraction component which is made to diffract the flux of light by which outgoing radiation was carried out from said two or more light emitting devices, respectively, and is made to penetrate in the predetermined direction of an optical axis The photo detector which receives the feedback flux of light based on the flux of light by which outgoing radiation was carried out from said two or more light emitting devices, respectively
[Claim 2] Optical pickup equipment characterized by providing the following. 1st supporter material in which the 1st back face was formed Two or more light emitting devices which carry out outgoing radiation of the flux of light of the wavelength corresponding to two or more kinds of optical record media with which it is arranged at said 1st back face, and recording density differs almost in parallel with said 1st back face The diffraction component which makes the feedback flux of light based on the flux of light from said light emitting device penetrate while making the flux of light by which outgoing radiation was carried out from said two or more light emitting devices diffract The photo detector which receives the 2nd supporter material which has the 2nd back face almost parallel to said 1st back face by which said two or more light emitting devices are arranged, and said feedback flux of light which has been arranged at said 2nd back face and penetrated said diffraction component
[Claim 3] It is optical pickup equipment according to claim 2 which two or more of said light emitting devices carry out outgoing radiation of the flux of light from across to the shaft which intersects perpendicularly with the diffraction side of said diffraction component, and is characterized by for the diffraction side of said diffraction component to diffract and penetrate the flux of light which carries out incidence from across to said diffraction side in accordance with the shaft which is in a field almost parallel to said 1st back face, and intersects perpendicularly with said diffraction side.
[Claim 4] For said optical path of the flux of light from the 1st light emitting device and optical path of the flux of light from said 2nd light emitting device, said two or more light emitting devices are optical pickup equipment according to claim 3 characterized by being in agreement after diffraction with said diffraction component including the 1st light emitting device which carries out outgoing radiation of the flux of light of the 1st wavelength, and the 2nd light emitting device which carries out outgoing radiation of the flux of light of the 1st wavelength and the 2nd different wavelength.
[Claim 5] The 1st light emitting device to which said two or more light emitting devices carry out outgoing radiation of the flux of light of the 1st wavelength, The 2nd light emitting device which carries out outgoing radiation of the flux of light of said 1st wavelength and the 2nd different wavelength is included. Said the 1st light emitting device and said 2nd light emitting device It is optical pickup equipment according to claim 3 characterized by having been mutually arranged in the opposite side to the shaft which intersects perpendicularly with the diffraction side of said diffraction component,

respectively, and having arranged said photo detector in accordance with the shaft which intersects perpendicularly with the diffraction side of said diffraction component.
[Claim 6] Optical pickup equipment according to claim 2 to 5 characterized by having further the reflective member which is arranged at said 1st back face, reflects said feedback flux of light which penetrated said diffraction component, and is led to said photo detector.
[Claim 7] Said 1st supporter material and said 2nd supporter material are optical pickup equipment according to claim 2 to 6 characterized by having a plane of composition almost parallel to said the 1st back face and said 2nd back face.
[Claim 8] The 2nd wiring member electrically connected to the 1st wiring member electrically connected to said 1st light emitting device at said 1st back face of said 1st supporter material and said 2nd light emitting device is arranged. In said 2nd back face of said 2nd supporter material The 3rd wiring member connected to said photo detector is arranged. Said a part of 1st and 2nd wiring member From said 1st supporter material to a projection Said a part of 3rd wiring member is optical pickup equipment according to claim 4 to 7 characterized by having projected from said 2nd supporter material.

[Claim 9] The optical record-medium driving gear characterized by having optical pickup equipment according to claim 1 to 7, the rotation mechanical component which rotates an optical record medium, the optical pickup mechanical component which moves said optical pickup equipment to radial [of said optical record medium], and the processing section which processes the signal outputted from the photo detector of said optical pickup equipment.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the optical record-medium driving gear equipped with optical pickup equipment and it.
[0002]
[Description of the Prior Art] In recent years, research and development in the optical pickup equipment corresponding to various information record media is done.
[0003] Drawing 8 is the block diagram of conventional optical pickup equipment. This optical pickup equipment is equipment which performs the focus servo by the astigmatism method, and the tracking servo by the 3 beam method, for example, is indicated by JP,3-76035,A.
[0004] As shown in drawing 8 , optical pickup equipment penetrates the semiconductor laser 102 which carries out outgoing radiation of the laser beam to the vertical upper part, the diffraction grating 103 for trichotomy which divides a laser beam into the three flux of lights, and the three divided flux of lights. The three flux of lights which penetrated the hologram component 104 which diffracts the feedback flux of light from an optical disk 100, and the hologram component 104 to the recording surface of an optical disk 100 and as three spots It has the photodetector 106 which detects the feedback flux of light diffracted with the condenser lens 105 and the hologram component 104 for condensing.
[0005] In above optical pickup equipment, from semiconductor laser 102, outgoing radiation of the laser beam of predetermined wavelength is carried out, it passes the optical system which consists of the diffraction grating 103 for trichotomy, a hologram component 104, and a condenser lens 105, and is irradiated by the recording surface of an optical disk 100. It is reflected as the feedback flux of light including the information recorded on the recording surface of an optical disk 100, and the irradiated flux of light penetrates a condenser lens 105 and the hologram component 104, and they carry out incidence to a photo detector 106. In a photo detector 106, a detecting signal, an informational focus servo signal, and an informational tracking servo signal are outputted based on the flux of light which received light, respectively.
[0006] Recently, the information record medium of the various specification that recording density, such as not only CD (compact disk) but track density, differs, for example, DVD etc., (digital videodisc) is developed. For this reason, optical pickup equipment which can reproduce the various information record media which have different recording density is desired.
[0007]
[Problem(s) to be Solved by the Invention] However, with the conventional optical pickup equipment shown in drawing 8 , the semiconductor laser 102 and each optical element which carry out outgoing radiation of a specific information record medium, for example, the laser beam of wavelength suitable for playback of CD, are set up. For this reason, the information record medium of other specification that recording density differs is unreproducible.
[0008] Then, artificers proposed the optical pickup equipment using two semiconductor laser components which carry out outgoing radiation of the laser beam of wavelength suitable for playback of

CD and DVD paying attention to the optical pickup equipment which has two or more light sources which carry out outgoing radiation of the light of wavelength suitable for the recording density of an information record medium. It applies as Japanese Patent Application No. No. 283461 [seven to], and the optical pickup equipment concerning this proposal has not been exhibited in the filing date of application of this application.

[0009] It carries out incidence of the feedback flux of light to a photo detector, and outputs an information detecting signal etc. while the optical pickup equipment concerning the above-mentioned proposal is chosen, and either of two semiconductor laser components carries out outgoing radiation of the laser beam of predetermined wavelength to the vertical upper part from the selected semiconductor laser component and makes it it carry out incidence to the recording surface of an information record medium according to the class of information record medium for playback.

[0010] Moreover, recently requires strongly the miniaturization of optical pickup equipment, lightweight-izing, and low-pricing. Then, artificers inquire wholeheartedly to the optical pickup equipment of the above-mentioned proposal according to this demand, and come to develop the optical pickup equipment of this invention.

[0011] The purpose of this invention is offering the optical record-medium driving gear equipped with the optical pickup equipment and it which could apply to two or more information record media with , which information recording density's differs, and were miniaturized.

[0012]

[The means for solving a technical problem and an effect of the invention] Two or more light emitting devices which carry out outgoing radiation of the flux of light from which the optical pickup equipment concerning this invention is arranged at a predetermined back face, and wavelength differs mutually in the direction almost parallel to a back face, The diffraction component which is made to diffract the flux of light by which outgoing radiation was carried out from two or more light emitting devices, respectively, and is made to penetrate in the predetermined direction of an optical axis, It has the photo detector which receives the feedback flux of light based on the flux of light by which outgoing radiation was carried out from two or more light emitting devices, respectively, and a photo detector is arranged at the back face by which two or more light emitting devices have been arranged, and a different back face.

[0013] In the optical pickup equipment concerning this invention, regeneration of two or more kinds of optical record media etc. is attained with one optical pickup equipment by having two or more light emitting devices which carry out outgoing radiation of the flux of light of the wavelength suitable for two or more optical record media with which recording density differs, and using it according to the class of optical record medium of a processing object, choosing the optimal light emitting device. And where optical pickup equipment is built into a regenerative apparatus etc., by having constituted so that it might become horizontal [most optical paths of the flux of light which carried out outgoing radiation, and the feedback flux of light based on it] from a light emitting device, the optical-path field which intersects perpendicularly with an optical record medium is shortened, and the thickness of the direction of a vertical of a light emitting/receiving unit is reduced, and the whole optical pickup equipment can be thin-shape-ized.

[0014] In addition, a light emitting/receiving unit is the part which carried out unitization of the light emitting device in optical pickup equipment, a transparency mold diffraction component, a photo detector, or the diffraction component for division, and is a part except the reflective mirror and condenser lens which are arranged in the optical path between an optical record medium and a diffraction component.

[0015] Furthermore, by having arranged the light emitting device and the photo detector to a different back face, it is prevented that the wiring member connected to the wiring member connected to a light emitting device and a photo detector is arranged at the same flat surface, and it can reduce the width-of-face dimension of a light emitting/receiving unit. The plane region of optical pickup equipment is reducible with this.

[0016] The 1st supporter material in which, especially as for the optical pickup equipment concerning

this invention, the 1st back face was formed, Two or more light emitting devices which carry out outgoing radiation of the flux of light of the wavelength corresponding to two or more kinds of optical record media with which it is arranged at the 1st back face, and recording density differs almost in parallel with said 1st back face, The diffraction component which makes the feedback flux of light based on the flux of light from a light emitting device penetrate while making the flux of light by which outgoing radiation was carried out from two or more light emitting devices diffract, It is arranged at the 2nd back face with the 2nd supporter material which has the 2nd back face almost parallel to the 1st back face by which two or more light emitting devices are arranged, and has the photo detector which receives the feedback flux of light which penetrated the diffraction component.

[0017] In the optical pickup equipment concerning this invention, regeneration of two or more kinds of optical record media etc. is attained with one optical pickup equipment by having two or more light emitting devices which carry out outgoing radiation of the flux of light of the wavelength suitable for two or more optical record media with which recording density differs, and using it according to the class of optical record medium of a processing object, choosing the optimal light emitting device. And where optical pickup equipment is built into a regenerative apparatus etc., by having constituted so that it might become horizontal [most optical paths of the flux of light which carried out outgoing radiation, and the feedback flux of light based on it] from a light emitting device, the optical-path field which intersects perpendicularly with an optical record medium is shortened, and the thickness of the direction of a vertical of a light emitting/receiving unit is reduced, and the whole optical pickup equipment can be thin-shape-ized.

[0018] Furthermore, by having arranged the light emitting device and the photo detector to a different back face, it is prevented that the wiring member connected to the wiring member connected to a light emitting device and a photo detector is arranged at the same flat surface, and it can reduce the width-of-face dimension of a light emitting/receiving unit. The plane region of optical pickup equipment is reducible with this.

[0019] Moreover, two or more light emitting devices carry out outgoing radiation of the flux of light from across to the shaft which intersects perpendicularly with the diffraction side of a diffraction component, and the diffraction side of a diffraction component diffracts and penetrates the flux of light which carries out incidence from across to a diffraction side in accordance with the shaft which is in a field almost parallel to the 1st back face, and intersects perpendicularly with a diffraction side.

[0020] Especially, it is desirable that the optical path of the flux of light from the 1st light emitting device and the optical path of the flux of light from the 2nd light emitting device are in agreement after diffraction with a diffraction component including the 1st light emitting device to which two or more light emitting devices carry out outgoing radiation of the flux of light of the 1st wavelength, and the 2nd light emitting device which carries out outgoing radiation of the flux of light of the 1st wavelength and the 2nd different wavelength.

[0021] In this case, optical system can be established in common to the flux of light from the 1st light emitting device and 2nd light emitting device after a diffraction component, the configuration of optical system is simplified and adjustment also becomes easy.

[0022] The 1st light emitting device to which two or more light emitting devices carry out outgoing radiation of the flux of light of the 1st wavelength especially, The 2nd light emitting device which carries out outgoing radiation of the flux of light of the 1st wavelength and the 2nd different wavelength is included. It is desirable that the 1st light emitting device and 2nd light emitting device of each other are arranged in the opposite side to the shaft which intersects perpendicularly with the diffraction side of a diffraction component, respectively, get down, and a photo detector is arranged in accordance with the shaft which intersects perpendicularly with the diffraction side of a diffraction component. In this case, if both 1st and 2nd light emitting devices are arranged to the one side of the shaft which intersects perpendicularly with the diffraction side of a diffraction component, it can prevent that the problem that the location which should station both approaches and arrangement becomes difficult arises. Moreover, it is desirable to have further the reflective member which is arranged at the 1st back face, reflects the feedback flux of light which penetrated the diffraction component, and is led to a photo detector. The

feedback flux of light can be easily drawn to the photo detector arranged by this at a different back face from a light emitting device.
[0023] It is desirable in the 1st supporter material and the 2nd supporter material having a plane of composition almost parallel to the 1st back face and 2nd back face especially. In this case, it becomes easy by making the 1st supporter material and the 2nd supporter material displaced relatively along a plane of composition to adjust the location of a reflective member and a photo detector.
[0024] Furthermore, the 2nd wiring member electrically connected to the 1st wiring member and the 2nd light emitting device which are electrically connected to the 1st light emitting device at the 1st back face of the 1st supporter material is arranged. The 3rd wiring member connected to a photo detector is arranged at the 2nd back face of the 2nd supporter material, and a part of 1st and 2nd wiring member has projected a part of projection from the 1st supporter material, and 3rd wiring member from the 2nd supporter material. In this case, it is formed in the flat-surface location where the 1st and 2nd wiring line part material connected to the 1st and 2nd light emitting devices differs from the 3rd wiring member connected to a photo detector. So, it is controlled that two or more wiring members are arranged at the same flat surface, and the width-of-face dimension of a light emitting/receiving unit increases, and the small optical pickup equipment to which the plane area was reduced by it can be obtained.
[0025] The optical record-medium driving gear concerning this invention is equipped with optical pickup equipment given in either of the above-mentioned invention, the rotation mechanical component which rotates an optical record medium, the optical pickup mechanical component which moves optical pickup equipment to radial [of an optical record medium], and the processing section which processes the signal outputted from the photo detector of optical pickup equipment.
[0026] In the optical record-medium driving gear concerning this invention, regenerative-signal detection of two or more kinds of optical record media with which recording density differs etc. is attained by having had optical pickup equipment which has two or more light emitting devices. And by having reduced the thickness and width of face of optical pickup equipment, it is small and the optical record-medium driving gear thin-shape-ized especially can be obtained.
[0027]
[Embodiment of the Invention] Drawing 1 is the side-face sectional view of the optical pickup equipment by one example of this invention. As for the optical pickup equipment of this example, regenerative-signal detection of CD and DVD is constituted possible. Optical pickup equipment 20 is equipped with the light emitting/receiving unit 21 with which unitization of 1st and 2nd semiconductor laser component 2a, 2b, the diffraction grating 4 for trichotomy, and the transparency mold hologram component 5 grade was carried out, the reflective mirror 14, and an objective lens 15 in drawing 1 .
[0028] Drawing 2 is the decomposition perspective view of a light emitting/receiving unit, drawing 3 is the top view of the upper frame of a light emitting/receiving unit, and drawing 4 is the top view of a bottom frame. In addition, in order to clarify physical relationship of each drawing in drawing 1 - drawing 4 , the X-axis, a Y-axis, and the Z-axis are indicated all over each drawing.
[0029] In drawing 2 - drawing 4 , the light emitting/receiving unit 21 has the case with which the laminating of the upper frame (2nd supporter material) 11 which consists of resin mold, and the bottom frame (1st supporter material) 10 was carried out, and adhesion immobilization was mutually carried out.
[0030] In drawing 2 and drawing 4 , the bottom frame 10 consists of plate-like resin mold, and it has crevice 10b by which back-face (1st back face) 10a and the diffraction grating 4 for trichotomy by which 1st and 2nd semiconductor laser component 2a, 2b, and reflective mirror 6 grade are arranged, and the transparency mold hologram component 5 are arranged. Moreover, flat plane-of-composition 10c joined to the upper frame 11 is formed in the periphery of back-face 10a and crevice 10b.
[0031] In drawing 4 , Z0 shows the optical axis of the feedback flux of light from an optical disk (optical record medium), Z1 shows the optical axis of the flux of light by which outgoing radiation is carried out from 1st semiconductor laser component 2a (the 1st light emitting device), and Z2 shows the optical axis of the laser beam by which outgoing radiation is carried out from 2nd semiconductor laser component 2b (the 2nd light emitting device). On back-face 10a of the bottom frame 10, two conductive heat sinks

1a and 1b are arranged, and the photodiodes 3a and 3b for 1st and 2nd semiconductor laser component 2a, 2b, and monitors are arranged on the top face of the conductive heat sinks 1a and 1b. Z1 shaft is in agreement in the primary [+] diffraction direction of the transparency mold hologram component 5 mentioned later, and 1st semiconductor laser component 2a is arranged in accordance with this Z1 shaft. Moreover, Z biaxial is in agreement in the primary [-] diffraction direction of a transparency mold hologram component, and the 2nd semiconductor laser 2b is arranged along with this Z biaxial.
[0032] 1st semiconductor laser 2a outputs a laser beam with a wavelength of 635nm, and is used at the time of DVD playback. Moreover, 2nd semiconductor laser component 2b outputs a laser beam with a wavelength of 780nm, and is used at the time of CD playback.
[0033] The photodiodes 3a and 3b for monitors are arranged at the back end side side of 1st semiconductor laser component 2a and 2nd semiconductor laser component 2b, respectively, and receive the laser beam by which outgoing radiation was carried out from 1st and 2nd semiconductor laser component 2a and the back end side of 2b as a monitor light, respectively. The output signal from the photodiodes 3a and 3b for monitors is outputted to an APC circuit (not shown), and it is controlled so that the output of the laser beam of 1st and 2nd semiconductor laser component 2a and 2b becomes fixed based on this output signal.
[0034] Furthermore, the leadframes 7c and 7f which supply power to 1st semiconductor laser component 2a and 2nd semi-conductor REZA component 2b at back-face 10a, respectively, In Leadframes 7c and 7f, the leadframes 7d and 7e by the side of reversed polarity, The leadframes 7a and 7h of community (for example, for a ground) in the leadframes 7b and 7g which output the signal from the photodiodes 3a and 3b for monitors and 1st and 2nd semiconductor laser component 2a, 2b, and the photodiodes 3a and 3b for monitors are arranged. The each leadframes [7a-7h] edge is projected from the end face of the bottom frame 10 to the method of outside.
[0035] Near the center of back-face 10a, the reflective mirror 6 is arranged in accordance with the optical axis Z0 of the feedback flux of light. The reflector leans six 45 degrees to a horizontal plane (Y-Z side), and it is set up so that the feedback flux of light which returns in accordance withZreflective mirror 0 shaft may be reflected in the vertical upper part.
[0036] The diffraction grating 4 for trichotomy and the transparency mold hologram component 5 are arranged at crevice 10b of the bottom frame 10. The diffraction-grating sides 4a and 4b where the diffraction grating 4 for trichotomy becomes a front face by the side of 1st semiconductor laser component 2a and 2nd semiconductor laser component 2b from the irregularity of pitches, such as each, are formed. Diffraction-grating side 4a of the diffraction grating 4 for trichotomy divides and carries out outgoing radiation of the laser beam by which outgoing radiation was carried out to the three diffracted lights, zero-order and the primary [+] order [1st / -], from 1st semiconductor laser component 2a. Moreover, diffraction-grating side 4b divides and carries out outgoing radiation of the laser beam by which outgoing radiation was carried out to the three diffracted lights, zero-order and the primary [+] order [1st / -], from 2nd semiconductor laser component 2b.
[0037] The transparency mold hologram component (diffraction component) 5 consists of translucency ingredients which have hologram side 5a to which a concavo-convex pitch becomes a front face by the side of the diffraction grating 4 for trichotomy from the curvilinear group which changes to a target gradually. And the three diffracted lights which penetrated the diffraction grating 4 for trichotomy in accordance with Z1 shaft are diffracted to Z0 shaft orientations, and the three diffracted lights by which outgoing radiation was carried out from the diffraction grating 4 for trichotomy along with Z biaxial are diffracted to Z0 shaft orientations. Preferably, the optical path of a laser beam with a wavelength of 635nm and the optical path of a laser beam with a wavelength of 780nm are in agreement after transmission diffraction in hologram side 5a. Moreover, the feedback flux of light from an optical disk is penetrated in accordance with Z0 shaft, and it leads to the diffraction grating 4 for trichotomy, and the reflective mirror 6.
[0038] In drawing 2 and drawing 3 , crevice 11b corresponding to back-face 11a in which the upper frame 11 becomes from plate-like resin mold, and the photodiode 12 for signal detection is attached, and crevice 10b of the bottom frame 10 is formed. Flat plane-of-composition 11c is formed in the perimeter

of back-face 11a and crevice 11b.
[0039] The photodiode 12 for signal detection is attached in the location which can receive the feedback flux of light from the reflective mirror 6 by which the light-receiving side 13 was attached in the bottom frame 10. In addition, although the light-receiving side 13 is displayed in the shape of [single] a rectangle in drawing 3 , it consists of two or more division light-receiving sides for outputting the focal signal and regenerative signal by the astigmatism method, and two or more division light-receiving sides for outputting the tracking error signal by the 3 beam method in fact. Moreover, the photodiode 12 consists of PIN mold photodiodes. Where a photodiode 12 is attached in back-face 11a, the light-receiving side 13 of a photodiode 12 is arranged almost in parallel with back-face 10a of the bottom frame 10.
[0040] Near the photodiode 12 for signal detection, two or more leadframes 14 for the signal output from a photodiode 12 are arranged. The end of a leadframe 14 is prolonged near the photodiode 12, and is electrically connected with the terminal of a photodiode 12 by the bonding wire. Moreover, the other end penetrated the upper frame 11 and has projected it from the end face of the upper frame 11 to the method of outside.
[0041] At the time of manufacture of light emitting/receiving unit 21 above equipment, the location of Z shaft orientations is adjusted so that, as for the transparency mold hologram component 5, 1st and 2nd semiconductor laser component 2a and the laser beam from 2b may connect a focus at the recording surface of CD and DVD, respectively. Moreover, to the bottom frame 10, along planes of composition 10c and 11c, the upper frame 11 is displaced relatively and adjusted so that the feedback flux of light reflected by the reflective mirror 6 may carry out incidence to the light-receiving side 13 of a photodiode 12 correctly. Termination of adjustment fixes the upper frame 11 and the bottom frame 10 with adhesives. Thereby, a light emitting/receiving unit 21 is completed. Furthermore, a light emitting/receiving unit 21 is arranged inside optical pickup equipment 20 so that it may become the reflective mirror 14 of optical pickup equipment 20 and a condenser lens 15, and position relation.
[0042] Next, actuation of the optical pickup equipment by this example is explained. Drawing 5 is the side-face mimetic diagram showing actuation of the optical system of the light emitting/receiving unit of the optical pickup equipment of drawing 1 , and drawing 6 is the mimetic diagram of the optical system of a light emitting/receiving unit.
[0043] With reference to drawing 1 , drawing 5 , and drawing 6 , playback actuation of DVD is explained first. Optical pickup equipment 20 drives 1st semiconductor laser component 2a, and carries out outgoing radiation of the laser beam with a wavelength of 635nm. Incidence of the laser beam B1 by which outgoing radiation was carried out from 1st semiconductor laser component 2a is carried out to diffraction-grating side 4a of the diffraction grating 4 for trichotomy of a transparency mold, and after being divided into the three diffracted lights, zero-order and the primary [+] order [1st / -], and penetrating, incidence of it is carried out to the transparency mold hologram component 5. The transparency mold hologram component 5 carries out the diffraction transparency of the three diffracted lights which carried out incidence in the primary [+] diffraction direction, and they carry out outgoing radiation to the reflective mirror 14 in accordance with Z0 shaft. The reflective mirror 14 reflects the three diffracted lights in the vertical upper part mostly. A condenser lens 15 makes the recording surface of DVD condense the three diffracted lights reflected by the reflective mirror 14 as the main spot and two subspots. The main spot is condensed by the informational recording surface (truck side), and two subspots are condensed by the location over a truck side and a non-truck side.
[0044] And it passes along a condenser lens 15 again, goes on in a vertical lower part, it is horizontally reflected by the reflective mirror 14, and incidence of the feedback flux of light from the main spot and two subspots is carried out to the transparency mold hologram component 5. The feedback flux of light which carried out incidence penetrates the transparency mold hologram component 5, penetrates the part in which the diffraction-grating sides 4a and 4b of the diffraction grating for trichotomy are not formed further, and it carries out incidence to the reflective mirror 6.
[0045] The reflective mirror 6 reflects the feedback flux of light in the vertical upper part, and leads it to the light-receiving side 13 of the photodiode 12 for signal detection attached in the upper frame 11.

[0046] Based on the feedback flux of light, a photodiode 12 generates a regenerative signal, the focal signal by the astigmatism method, and the tracking error signal by the 3 beam method, and outputs them through a leadframe 14.
[0047] Next, playback actuation of CD is explained. The laser beam of long wavelength is used for playback of CD compared with playback of DVD. That is, 2nd semiconductor laser component 2b which carries out outgoing radiation of the laser beam with a wavelength of 780nm drives. Incidence of laser beam B-2 by which outgoing radiation was carried out from 2nd semiconductor laser component 2b is carried out to diffraction-grating side 4b of the diffraction grating 4 for trichotomy. Diffraction-grating side 4b divides and penetrates laser beam B-2 to the three diffracted lights, zero-order and the primary [+] order [1st / -]. The three diffracted lights are diffracted in the hologram side of transparency mold hologram component 5 5 -primary direction, and outgoing radiation is carried out by a in accordance with Z0 shaft.
[0048] Then, like playback actuation of DVD, the three diffracted lights penetrate the reflective mirror 14 and a condenser lens 15, and are condensed by the recording surface of CD as the main spot and two subspots. Furthermore, incidence of the feedback flux of light reflected by the recording surface of CD is carried out to the transparency mold hologram component 5 through a condenser lens 15 and the reflective mirror 14. Furthermore, the transparency mold hologram component 5 and the diffraction grating 4 for trichotomy are penetrated, and the reflective mirror 6 is reached. The reflective mirror 6 reflects the feedback flux of light in the vertical upper part mostly, and the light-receiving side 13 of the photodiode 12 for signal detection is made it to carry out incidence. A photodiode 12 outputs the regenerative signal of CD, the focal signal by the astigmatism method, and the tracking error signal by the 3 beam method based on the feedback flux of light which received light, respectively.
[0049] the 1st semiconductor laser component 2 which carries out outgoing radiation of the laser beam of short wavelength suitable for playback of DVD with above optical pickup equipment -- the long wave suitable for playback of a and CD -- the both sides of CD and DVD where recording density differs with single optical pickup equipment can be regenerated by having 2nd semiconductor laser component 2b which carries out outgoing radiation of merit's laser beam, and using 1st and 2nd semiconductor laser component 2a and 2b properly according to the record medium for playback. And except for 1st and 2nd semiconductor laser component 2a which is the light source, and 2b, other optical system is not based on the class of optical record medium, but is used in common. So, miniaturization and low-pricing can be attained, without making the mark of the component part of optical pickup equipment increase.
[0050] Furthermore, thickness of the direction of a vertical of optical pickup equipment can be made thin by having made horizontal 1st and 2nd semiconductor laser component 2a and the direction of outgoing radiation of the laser beam from 2b.
[0051] Furthermore, it becomes possible by having formed the photodiode 12 for signal detection in back-face 11a of a different upper frame 11 from the optical system of the diffraction component 4 for trichotomy, the transparency mold hologram component 5, and reflective mirror 6 grade to perform justification with optical system independently correctly.
[0052] In addition, although the above-mentioned example explained the optical pickup equipment which can reproduce two kinds of optical record media, CD and DVD, it is possible to perform playback or record processing by having further the light source of the optimal wavelength for the playback or record also to the optical record medium which has other recording density.
[0053] Moreover, in the above-mentioned example, although the transparency mold hologram component was used as a diffraction component, a reflective mold diffraction grating may be used, for example, without being limited to this.
[0054] Drawing 7 is the block diagram showing the configuration of the optical record-medium driving gear which used the optical pickup equipment of this example. An optical record-medium driving gear has the roll control system 26 which controls rotation actuation of the motor 27 and motor 27 which carry out the rotation drive of the optical disk 100. Moreover, the delivery motor 22 which optical pickup equipment 20 makes move the detection location of optical pickup equipment 20 to radial [of an optical disk 100] is connected. As for the delivery motor 22, the actuation is controlled by the delivery

motor control system 23. Actuation of optical pickup equipment 20 is controlled by the pickup control system 24, and the output from optical pickup equipment 20 is controlled by the signal-processing system 25.

[0055] Furthermore, actuation of each processor of an optical record-medium driving gear is controlled by the drive controller 28. This optical record-medium driving gear is connected to a regenerative apparatus through the drive interface 29, and information regeneration based on the detecting signal from optical pickup equipment 20 is performed.

[0056] By using the optical pickup equipment 20 of this invention for the above optical record-medium driving gears, it becomes possible to regenerate two or more kinds of optical record media. Furthermore, the whole optical record-medium driving gear can be miniaturized by having miniaturized optical pickup equipment 20.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the side-face sectional view of the optical pickup equipment by the example of this invention.
[Drawing 2] It is the decomposition perspective view of the light emitting/receiving unit of the optical pickup equipment of drawing 1 .
[Drawing 3] It is the top view of the upper frame of the light emitting/receiving unit of drawing 2 .
[Drawing 4] It is the top view of the bottom frame of the light emitting/receiving unit of drawing 2 .
[Drawing 5] It is the side-face mimetic diagram showing actuation of the optical system of a light emitting/receiving unit.
[Drawing 6] It is the mimetic diagram showing actuation of the optical system of a light emitting/receiving unit.
[Drawing 7] It is the block diagram showing the configuration of the optical record-medium driving gear using optical pickup equipment.
[Drawing 8] It is the block diagram of conventional optical pickup equipment.
[Description of Notations]
2a, 2b The 1st semiconductor laser component, the 2nd semiconductor laser component
4 Diffraction Grating for Trichotomy
4a, 4b Diffraction-grating side
5 Transparency Mold Hologram Component
5a Hologram side
6 Reflective Mirror
10 Bottom Frame
11 Upper Frame
10a, 11a Back face
10c, 11c Plane of composition

[Translation done.]

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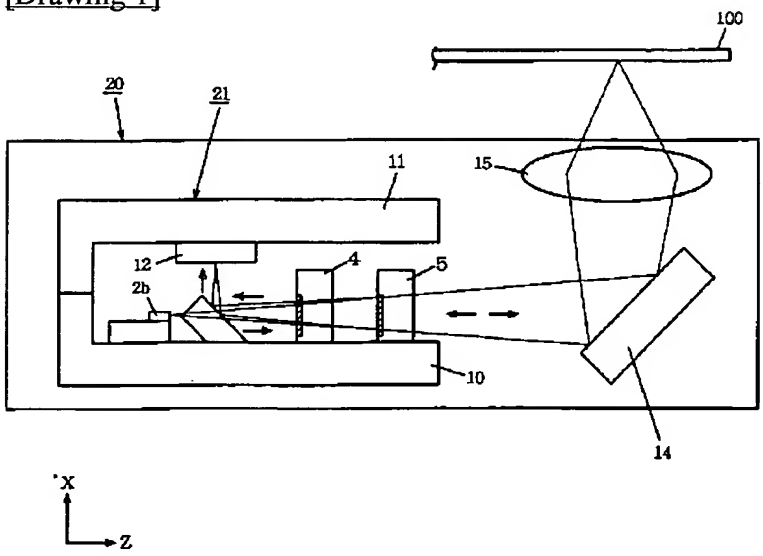
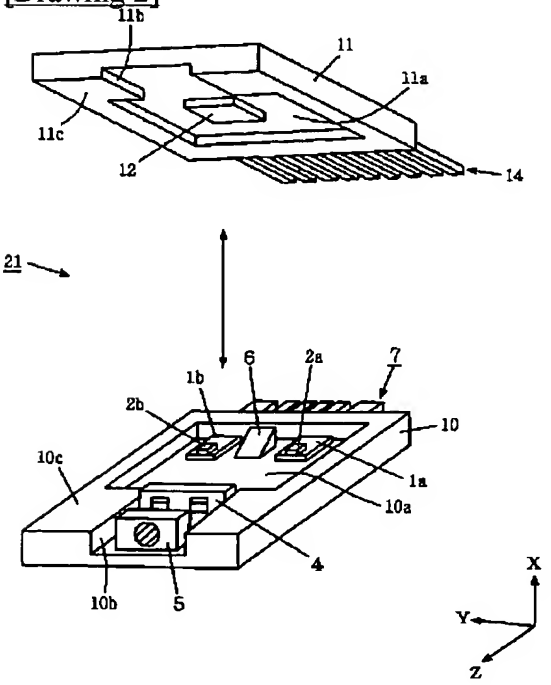
DRAWINGS

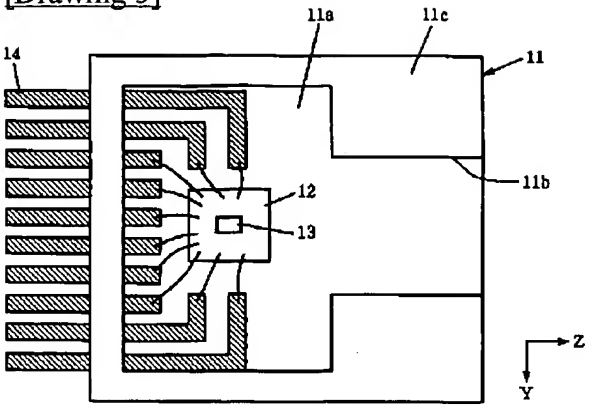
[Drawing 1]



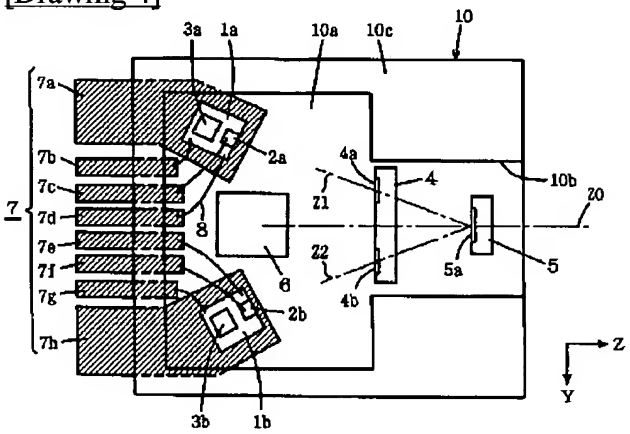
[Drawing 2]



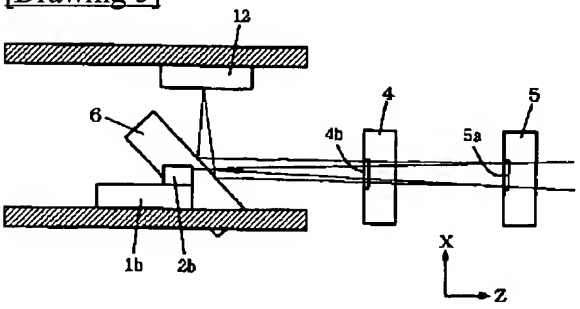
[Drawing 3]



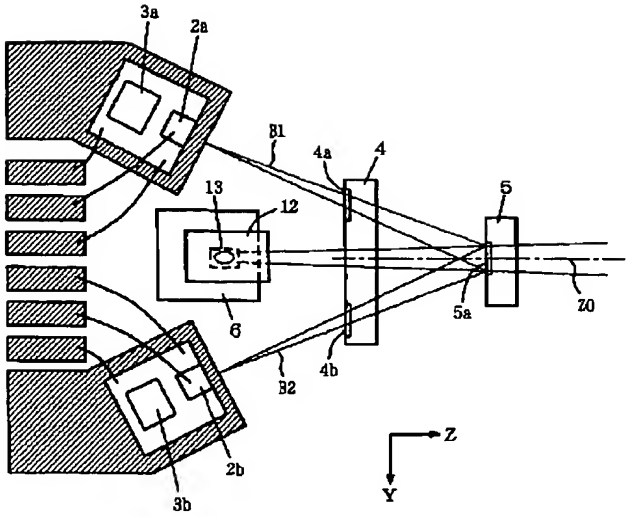
[Drawing 4]



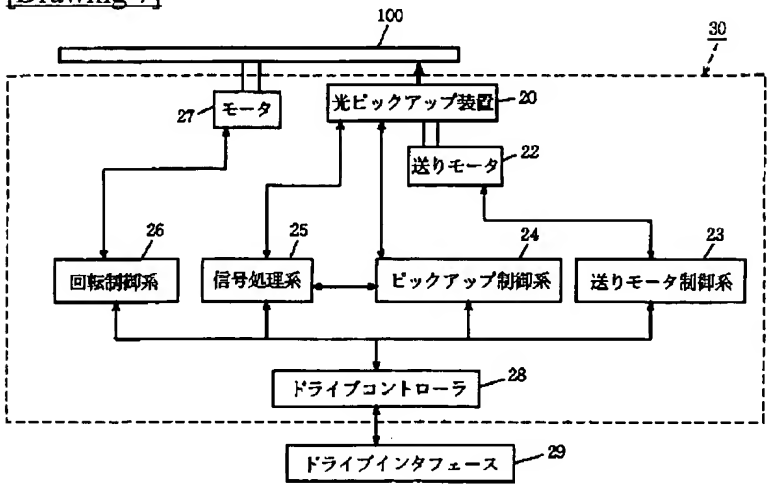
[Drawing 5]



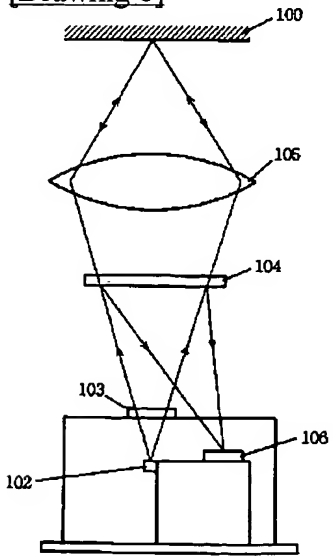
[Drawing 6]



[Drawing 7]



[Drawing 8]



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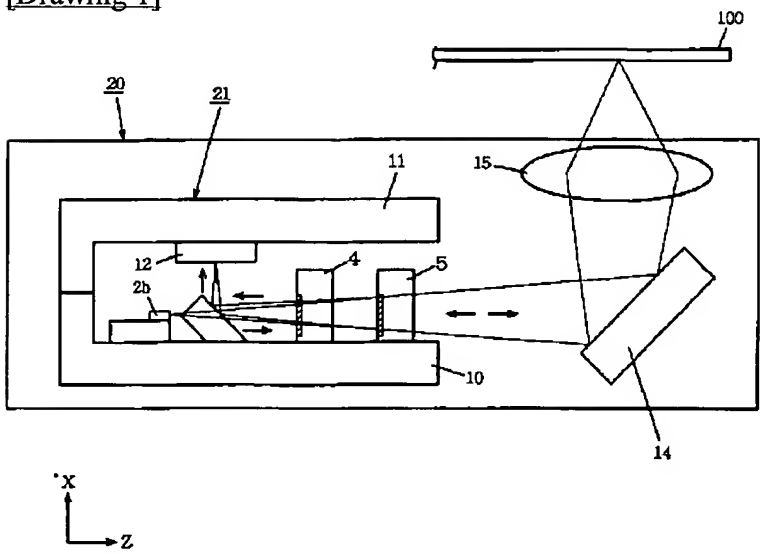
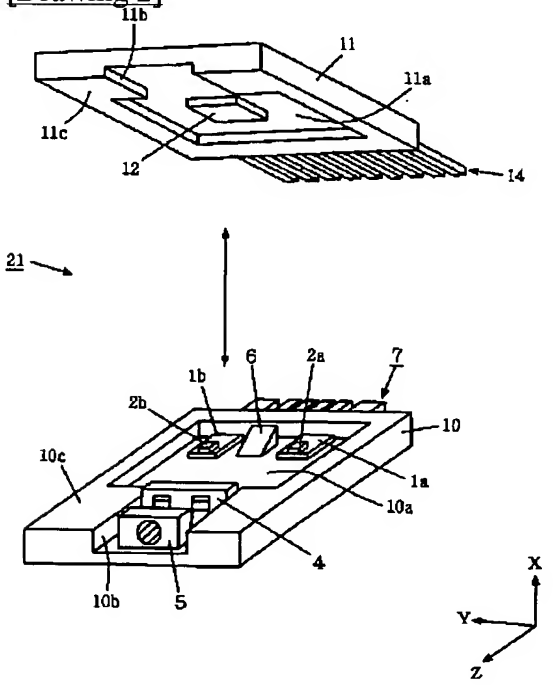
DRAWINGS

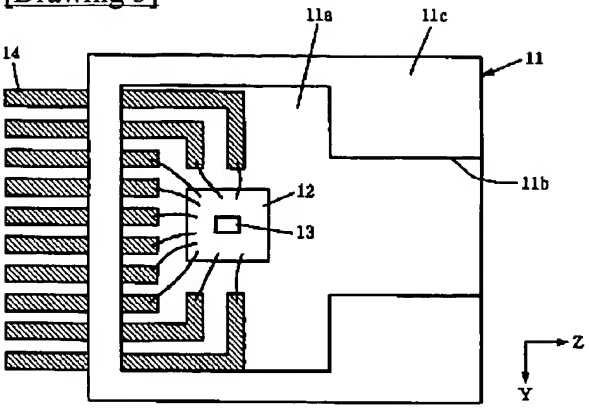
[Drawing 1]



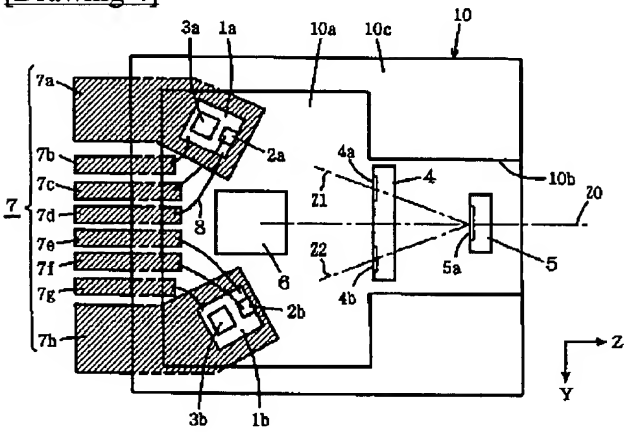
[Drawing 2]



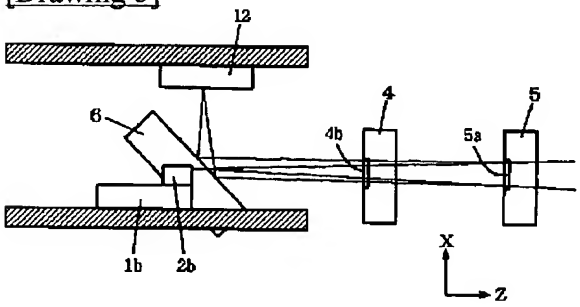
[Drawing 3]



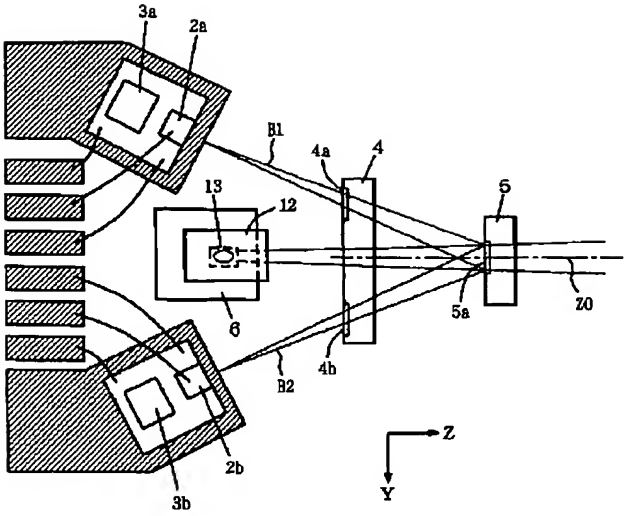
[Drawing 4]



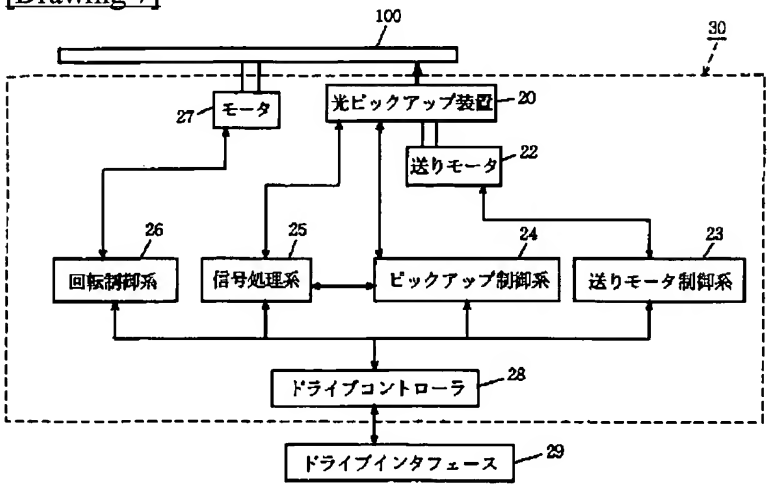
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Drawing 8]